3-1-7

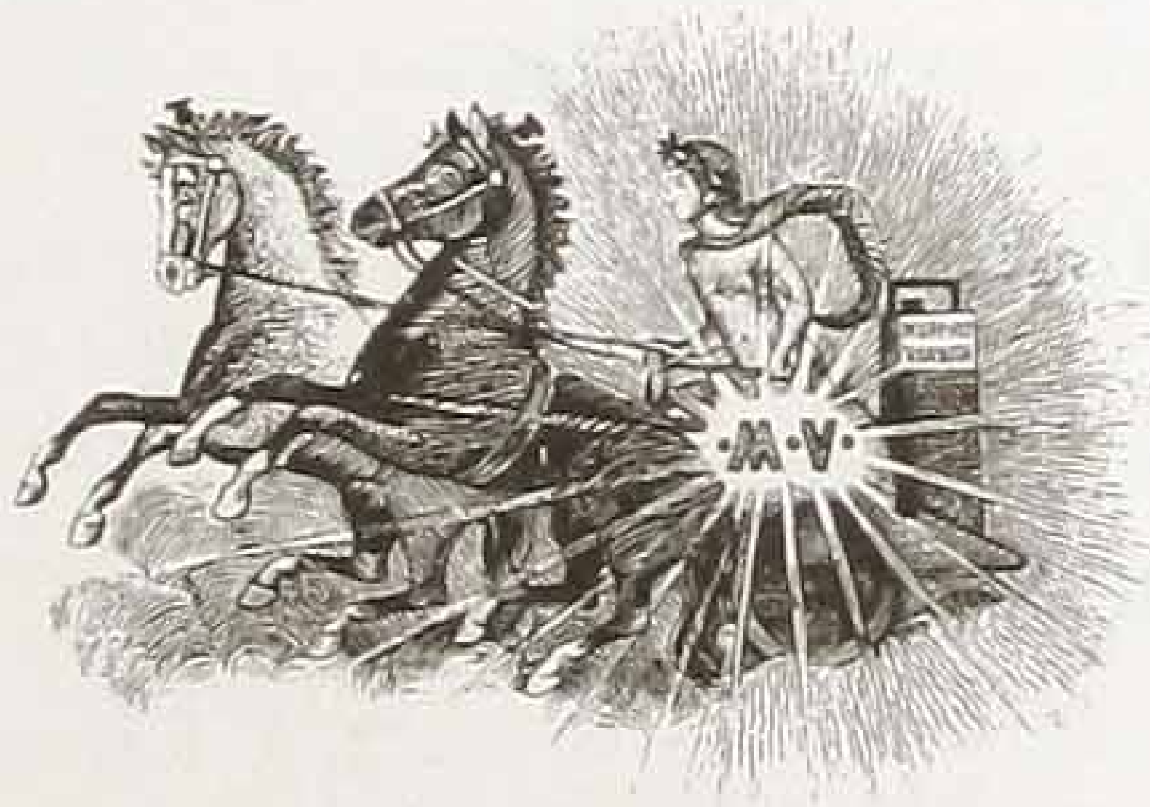
The STORY of the MURPHY VARNISHES

The Story of the Murphy Varnishes

307-7. Murphy

The Story
# of the
Murphy Varnishes

12/2/87



MURPHY & COMPANY
Publishers
1886

MURPHY & COMPANY,

VARNISH MAKERS.

(INCORPORATED.)

PRESIDENT,

FRANKLIN MURPHY,	Newark, N. J.

VICE-PRESIDENTS,

JAMES G. BARNET,	Newark, N. J.
HENRY A. SHERWIN,	Cleveland, O.

TREASURER,

WILLIAM H. MURPHY,	Newark, N. J.

SECRETARY,

CHARLES D. ETTINGER,	Chicago, Ill.

SUPERINTENDENT,

HENRY M. MURPHY, E. M.,	Newark, N. J.

GENERAL MANAGER

JOSEPH MERRILL, Jr.,	Cleveland, O.

RESIDENT MANAGERS,

A. B. Garner,	227 Broadway, New York City.
S. D. Conklin,	566 Canal St., Cleveland, O.
M. H. Stearns,	300 So. Fourth St., St. Louis, Mo.
F. H. Taylor,	262 Wabash Ave., Chicago, Ill.

Copyright, 1886, by Murphy & Company.

THE STORY

OF THE

MURPHY VARNISHES.

THE industrial lesson of this week at the Institute of Technology was on the subject of "Paint and Varnish, or Surface Decoration." And it proved so interesting and valuable, that we have concluded to give a full report of it for the general reader.

On opening the exercises Tuesday, Professor Deering said:

"Gentlemen: This is the tenth of our lessons on practical Mechanics. We have thus far considered Iron and its products; Wood and how to work it; The Precious Metals; Glass, Leather, Cotton, and other cognate topics; and while of necessity they have been treated superficially, I am sure the study has been of real value to us all. To-day we will find out what we know about Varnish. Some of the class are the sons or relatives of manufacturers who use varnish in their business, and will know something of the subject practically; others have read what they could along the same line. I have made arrangements by which this afternoon, we will visit a large railroad car-shop and a great varnish establishment.

"Now, gentlemen, about artificial varnishes, for they are what we use in this country. Good varnish seems to me the most valuable finisher that civilized man is acquainted with—the art-preservative of arts, it might be called. Raw wood is not very ornamental. But see these lovely varnished surfaces around us—the furniture, that carriage out the window yonder, whose panels reflect the street and houses on either side, the railroad car in which some of us will go home to-night. The pigment seems as deep as the sea, but there is only a film of it. How many kinds of artificial varnishes have we—Gilder?"

"I have not prepared myself on this lesson," said that gentleman.

"Starr, how many kinds?"

"Three, sir, we may say, owing, mainly, to the different solvents used to change the resin to a liquid form:

"1.—The spirit varnishes, where alcohol is used.

"2.—The volatile-oil varnishes, where the solvent is turpentine.

"3.—The fixed-oil varnishes, where the resin must be melted, and then combined with turpentine and linseed oil.

"This last is far the most important. The alcohol used to make the spirit varnishes evaporates very quickly, leaving a non-elastic coating which,

ID 89-B6366 TCF

lacking durability, makes this kind of varnish suitable only for work that is not subject to exposure. Furniture makers use it as a first coat or foundation for coats of fixed-oil varnishes, and often without such additional coats.

"The resin commonly used in the spirit-varnishes is lac, best known as shellac. It is the product of the banyan tree of India, which, being stung by a certain insect yields the juice. The lac in which the insect has laid its myriads of eggs is known as seed-lac; that which is sent to market on the branch where it hardened, is called stick-lac; and that which has been purified by melting and then straining through linen, and hardened in thin sheets, is called shell-lac.

"Volatile-oil varnishes are inferior in quality, being neither so brilliant and delicate as the spirit varnishes, nor so permanent and enduring as the fixed-oil varnishes. They are generally a solution of soft resins with turpentine, and are used on wall paper, maps, and in mixing with paints to produce a 'gloss' finish."

"Now can you tell us what the fixed-oil varnishes are made of?"

Mr. Starr continued: "Their base is copal—the general name by which fossil resins are known in this country; in England the term Animi is similarly applied to some of the resins used by varnish makers.

"Copal is found in many parts of Asia and Africa, and even in Europe, like its elder and aristocratic sister, amber; but the most famous fields are the Eastern sea-coast of equatorial Africa, opposite the Islands of Zanzibar and Madagascar. The copal-diggers prod the sandy shore to the depth of one or two feet with a short spear, but occasionally they overcome their indolence and thriftlessness and dig deeper, where the larger specimens of the shining yellow bits are buried.

"Zanzibar copal is superior to other fossil resins in hardness, transparency and purity. But there are other well known fields, as Guinea, the Congo district, and the west coast of Africa; New Zealand, where the gum is yielded by a tree resembling the mahogany, and the Phillippine Islands, which yield the Manila and Dammar, (though this latter is not a fossil, being a gum from the fresh juice of a tree but recently oxydized)."

"Another thing, gentlemen, may as well be considered here," the Professor suggested, "the surface of wood is generally unpromising. When a car or carriage comes from the hands of the workers in wood, it is not a handsome object in anything, except in form. I stepped into a car shop the other day, and saw one at this stage. It was far enough from being smooth, and, looked at through a magnifying glass, the surface was very torn, ragged, irregular, full of hills and dales, and underbrush, to be filled up and smoothed down before any real varnishing could be done."

"I have a treatise on wood here," said Mr. Gilder," and I would like to read a paragraph on this wood-filling, as my small contribution to this lesson."

It being so agreed, he read: "But before applying either coloring or varnish, it is necessary to use filling and priming to obliterate the interstices—to fill up the parenchyma, sclerenchyma, annulated and scariform ducts and medullary rays in the tangential sections variously agglomerated throughout the vascular and fibrous tissue of all ligneous"——[the rest of the paragraph was quenched in laughter.]

"That's it!" said the Professor, "they must fill up the pores, before the wood is fit to put a good varnish on, and for this purpose a priming composition is used, which we will learn more about in our visit to the car shops; but it is now about time to fall in for the varnish factory at Newark, taking the car shops on the way. Before we start has anybody anything to add to this preliminary lesson?''

''I can contribute a mere word,'' said a pupil who had not before been heard. ''America uses more varnish than all the rest of the world combined. Varnish is to some extent a luxury, and no other nation is so rich as ours. No other country has so many comfortable homes, filled with so much good furniture. Our climate is so dry that furniture goes to pieces, not to mention the fact that we are furniture-smashers because of our very restlessness. No other country has a quarter as many pianos as we. In no other land do so many people own their own carriages, while in the matter of railroad cars, we have more and handsomer ones than all the rest of the world put together. We are carriage-smashers, too; in Europe the roads are much better than ours, and a runaway horse is a sight seldom seen. We are a nation of varnish users.''

Office of Murphy & Company * Varnish Makers · New York. Cleveland. Chicago. St. Louis.
THE MURPHY CABINET VA
THE MURPHY RAILWAY VARNISHES
THE MURPHY COACH VARNISHES
THE MURPHY VARNISHES
THE A.B.C. System of Railway Painting M.&Co.
MURPHY & CO.
MURPHY & CO
MURPHY
MURPHY
5T AVENUE HOTEL
NELSON & MYERS

MAIN OFFICE OF MURPHY & CO. AT NEW YORK.

It was agreed that the ''mere word'' was an important one, and the Institute started for the car shops.

They were found without trouble, and the foreman was ready to receive them. After showing them the handsome palace cars ready for the road, and others in a state of progress, he said:

''It is no fool's job to varnish a car so that it will look like that one, even after you've got a first-rate varnish. The wood itself is full of irregularities to begin with.''

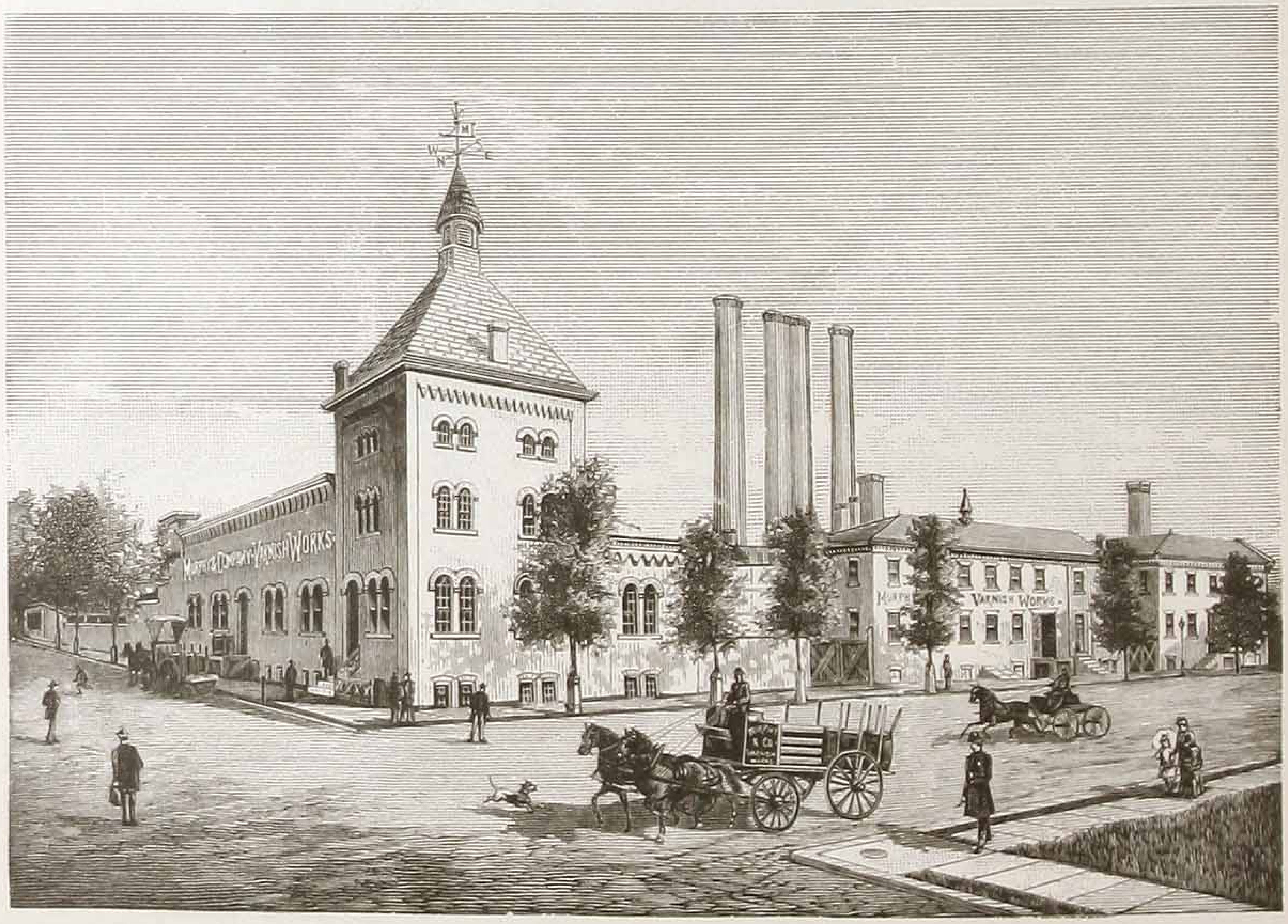
"Yes," interrupted Gwynne, "Gilder told us about priming the parenchyma, and all that sort of thing."

"To make an artificial surface," the foreman went on, "various fillings are used by different makers. We use the A B C surfacers of Murphy & Co. That car yonder has just received the first coat—surfacer A; this has had surfacers A and B; and the nail-heads, etc., have been puttied up; this has received surfacers A, B and C; that car over yonder has had surfacer A and B, and three coats of C has been rubbed down with pumice-stone, and is now ready for the color and ornamentation, after which follow the varnish coats.

"This car has been here eight days now, receiving the various priming coats and drying after each."

In reply to a question by the Professor, as to the character of these so-called surfacers, the foreman said, "they are for the purpose of giving a non-porous, and perfectly smooth and hard foundation for the color and the varnish, without which the finest results in finish and durability cannot be had.

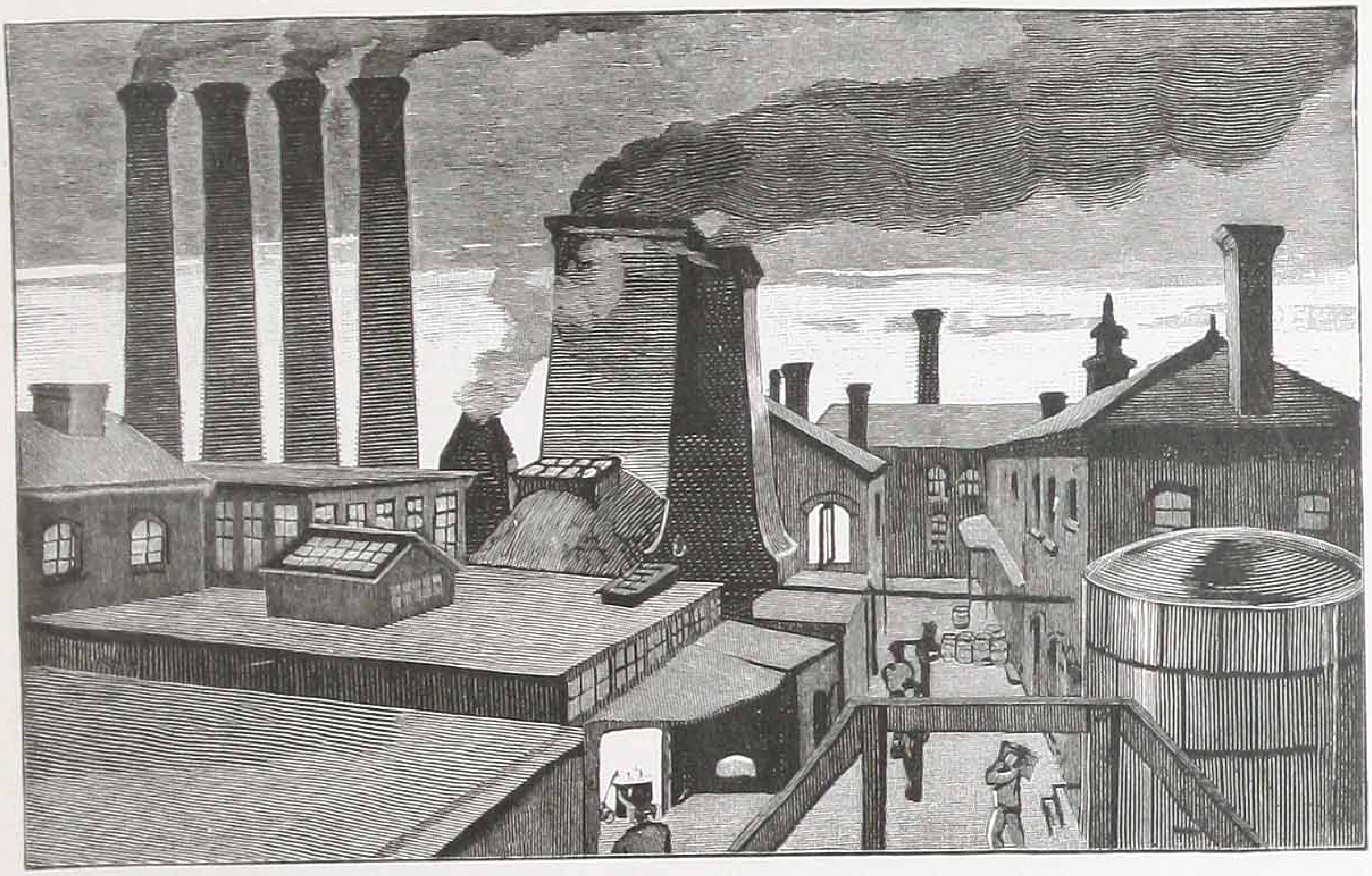
"Surfacer A will render any kind of wood permanently water-proof and bind down the grain. A priming composition must be penetrative, tenacious and elastic. It has got to get right down into the wood and stay there and become a part of the wood. Now I can take a piece of wood and give it a coat of surfacer A, let it dry forty-eight hours and soak it in water for weeks without affecting the grain. In old times we used to put on several coats of lead and oil, but these surfacers not only do the work better but quicker and cheaper.



WORKS OF MURPHY & CO. AT NEWARK, N. J.

"Surfacer B, which we put over surfacer A, is very much the same thing only more so; that is, it puts a little more filling into the pores of the wood."

"Excuse me," said the Professor, "I was telling the scholars of the ragged and uneven appearance of the wood seen through a magnifying glass. I suppose these surfacers A and B have filled up the hills and holes and smoothed down the underbrush, etc."



INTERIOR VIEW OF THE WORKS AT NEWARK.

"Yes, sir," said the foreman, "that's a good way to put it; they have not only leveled the underbrush, (I suppose you mean the fuzzy grain,) but it's leveled to stay and cannot rise again.

"This surfacer C that we follow with on surfacer B is what we call a leveler. A and B might be called the foundation, but C is the 'cap stone' of the structure we have to build for the painting and varnish. We used to use what is called 'roughstuff' on the lead and oil coats, and while this surfacer C performs the same office it is not of the same composition, and you can get results with it that you couldn't be sure of in the old way, for it will neither crack nor flake, and you see how uniformly hard and smooth it is; just run your hand over that panel.

"This A B C system is way ahead of the old method; somebody may get up something that will beat it, but during the seven or eight years we have been using it nobody has given us a safer or surer system, although we have tested all of 'em."

"Do they use these A B C surfacers on all sorts of work?" asked the Professor.

"Oh, no," said the foreman "only on the exterior of coaches and cars, locomotive tenders or wherever there is an exposed surface on which we desire to preserve the painting and show up brilliant and permanent lustre."

"Do you ever polish by hand?" asked the Professor.

"No, sir; the outside of cars do not receive hand polish in this country.

We simply flow on one or more coats of Murphy's Pale Railway Body Varnish for the finish. Yonder is a workman applying the last coat. See how lightly he touches it. See how pure and colorless the varnish is. That's the Pale Railway Body. Some of the inside panels, however, are sometimes hand polished.

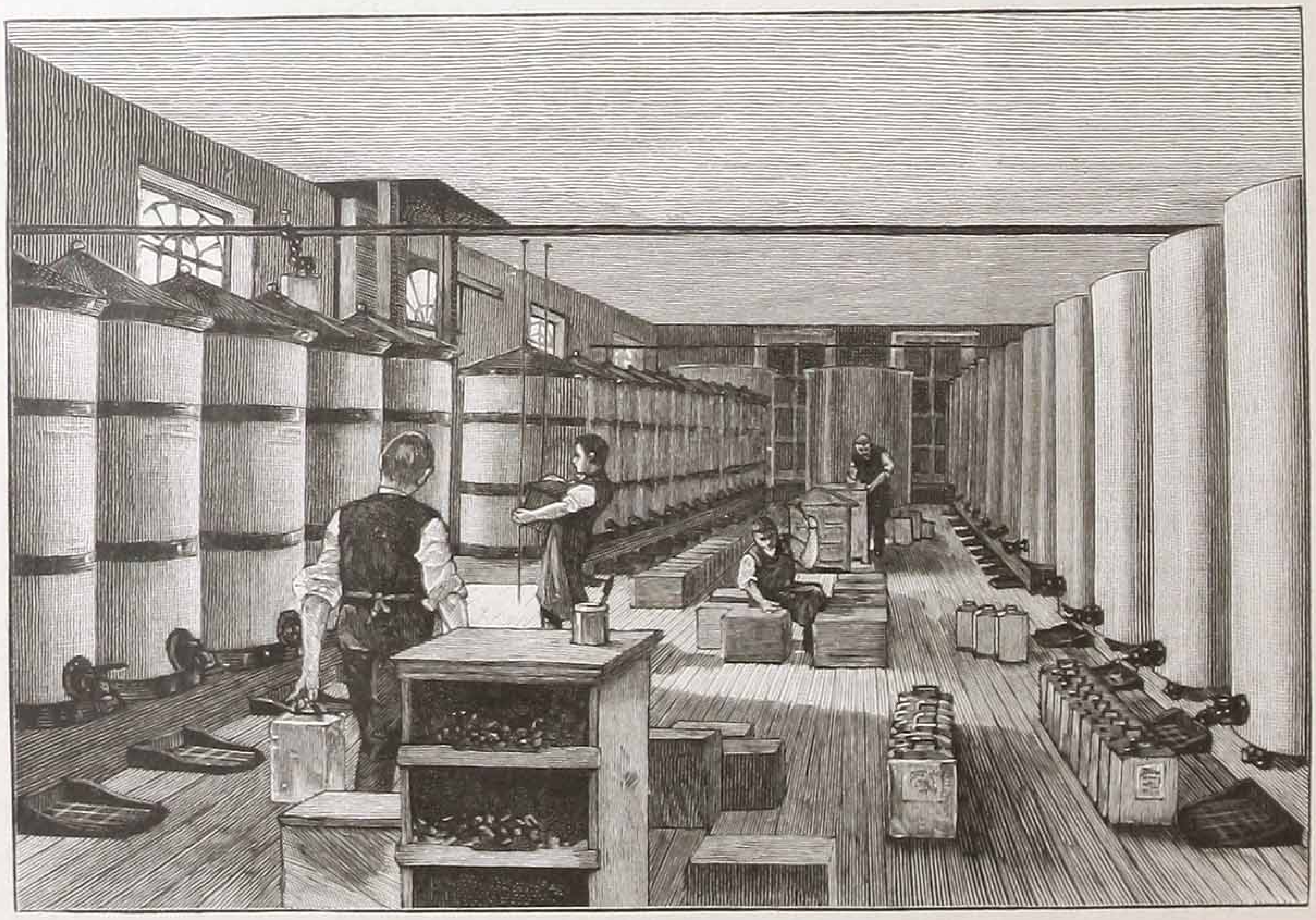
"Look at that finished car. How the panels reflect everything—forms without a flaw, colors with exactness."

"What do you think about varnish being objectionable, Gwynne?" asked Clements.

"Hit me on the head with that mallet!" exclaimed Gwynne, bowing for the sacrifice. As they hesitated, he said, "varnish is not the hypocrite I thought it. On the contrary, like the proverbial mirror and the bottom of the well, it shows us nothing but truth."

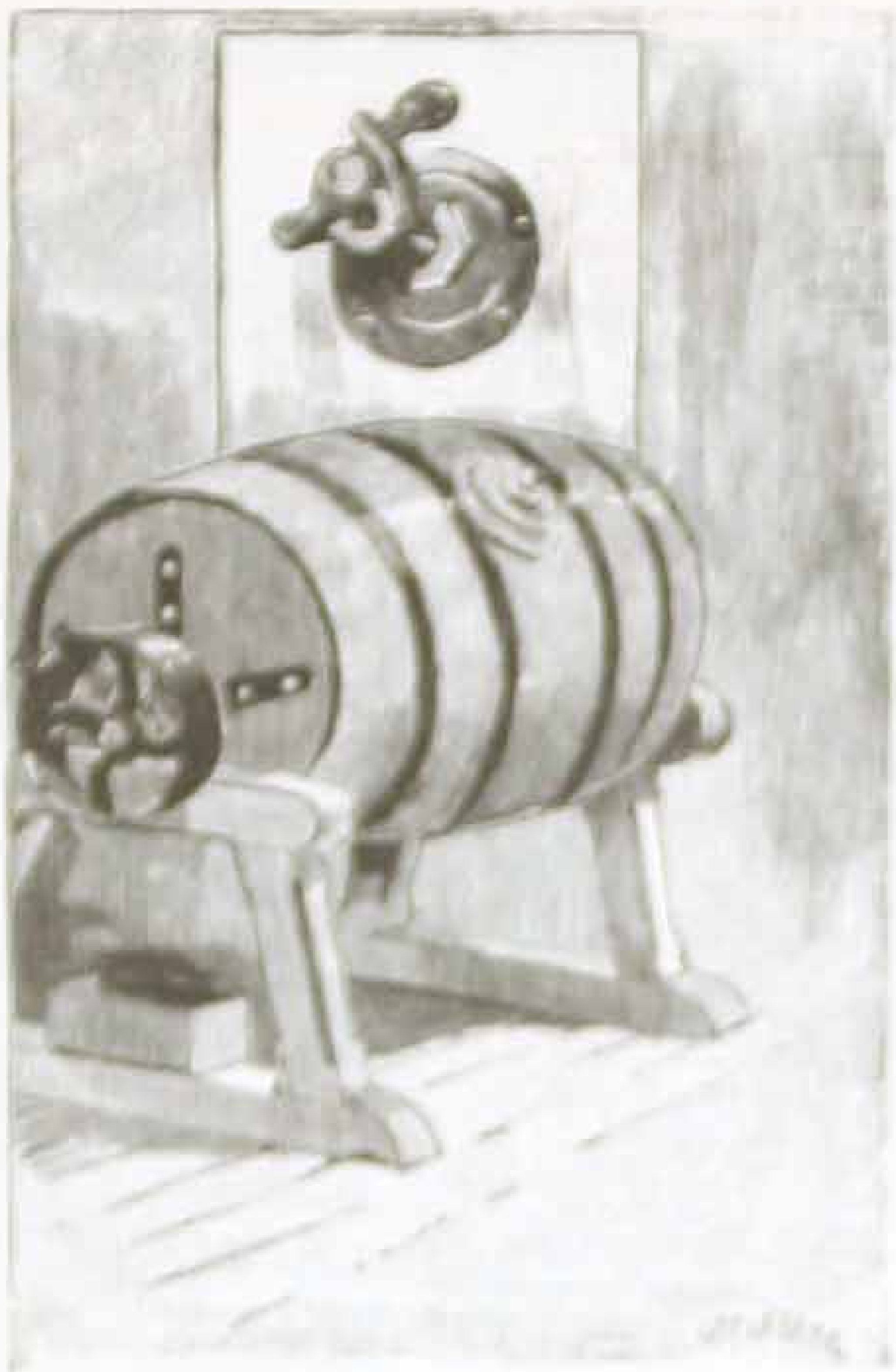
"We shall have to forgive you," said the Professor, "now that, like the mirror and the well, you have begun to reflect."

"You are going up to Murphy's factory, I understand," said the foreman; "well, I'd just like to say a word about their varnishes. We don't use any other make in these shops, but I don't say now and never have said that nobody ever does or ever can make as good varnish as Murphy's, for these small varnish makers do hit it sometimes and turn out a good lot of varnish, but oftener it's just the other way. We must not only have good varnish but it must be uniformly good, one lot just the same as the other.



SHIPPING ROOM, NEWARK WORKS.

"The way I look at it, you can't get this uniformity unless you are doing business on a broad gauge; plenty of capital, plenty of room, organization and system. Now these small manufacturers can't be sure of getting uniform raw material where they buy in small quantities, their formulas may be all right, but you know oils and gums are not all the same, you may



SPIRIT-VARNISH CHURN.

get one good lot, then a poor one; why, there's no question about the advantages the large producer has over the small ones. With these uncertain varnishes you never know where you are, and you're more than likely to find your car in the morning flatted or enameled or blotchy or wrinkled or some other deviltry. Excuse me, gentlemen, I do not use the word in a moral but a technical sense — it is a general name for the vicious didos and cuttings-up which varnish is subject to. But with the Murphy varnishes you know what to count on, for in my experience, and I've handled a brush for many a year, they are uniform, and while every varnish room has trouble from one cause or another, we have so little with Murphy's stock that it isn't worth mentioning, in fact, comparatively speaking, we don't have any. Their uniform excellence is what counts, they beat the guess-work varnish out of sight. When you buy it you know what you will get, and if put on properly it turns out a good job. It costs a little more; but I believe the extra wear more than makes up the difference, to say nothing of the nicer face it gives things, and the saving in not having to do over spoiled work, for you see, gentlemen, it takes a pile of labor and time to rub off a bad job and re-varnish it, to say nothing of the vexation."

"Between the best and the second best there is a great difference, then?" asked Mr. Clements.

"Yes; a greater difference than there is between best and second-best butter. Besides, in the old times, I could never be sure that I was getting even second best. When you buy shoes, you know pretty nearly what you have got; when you order a coat you can detect the blemishes; but in ordering varnish you must depend mostly on the reputation of the manufacturer. Reputation for careful and honest treatment stands a manufacturer in hand, I tell you. Why, there are a dozen different grades of varnish makers. Many of them do business in any way, sell anything they have on hand for any price you want to pay. They don't have standard grades made for a specific purpose. A glib-tongued salesman can sometimes make a man buy anything, but every large buyer of varnish who is wise will carefully investigate the character and resources of the manufacturer to whom he looks for supplies, and when he is satisfied will stick to it. There is no business in which it is more risky to use an inferior product."

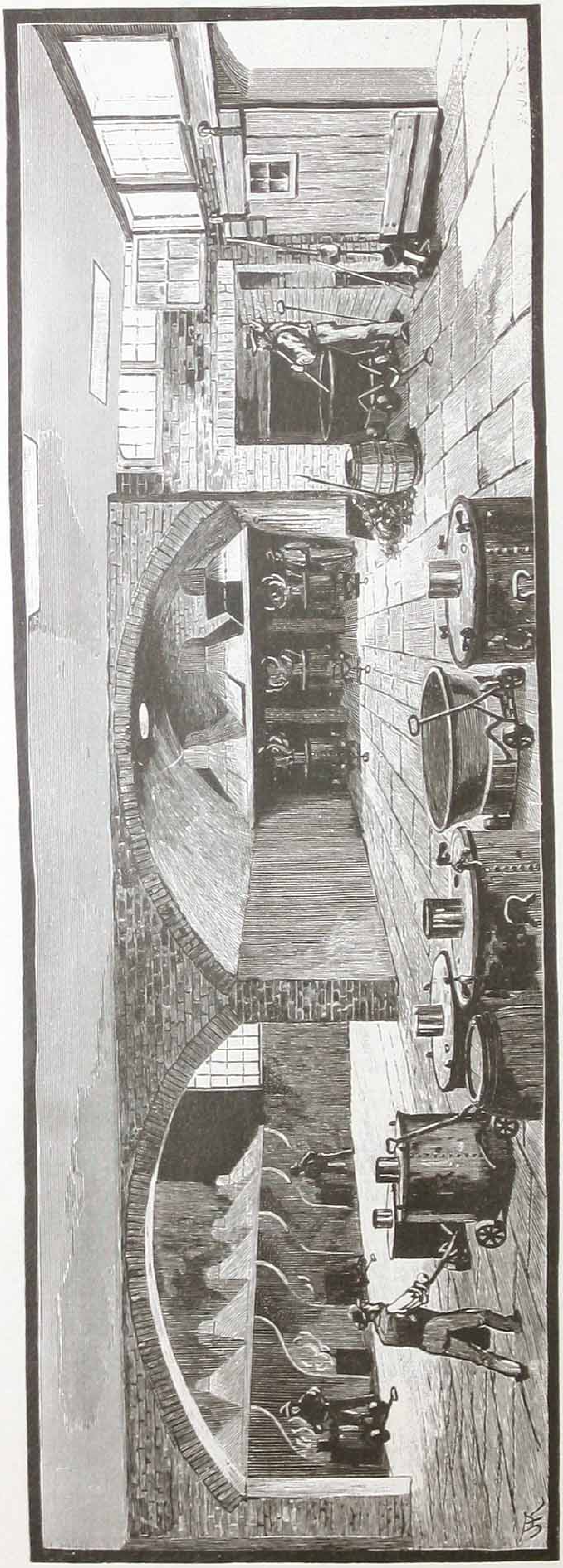
"How long does it take to run out to Murphy & Co's?" asked the Professor, consulting his watch.

"It's only a step," answered the foreman; "thirty minutes from New York."

The Professor remarked that it was time to go, made acknowledgments for politeness and took his leave with the visiting class.

There was a whistle, a rattle and a whirl, and the investigators were at the Chestnut Street depot of the Pennsylvania Railroad, near which rise the sombre walls and towering chimneys of Murphy & Co's—one of the greatest varnish manufacturing establishments of the world.

The Professor and his pupils saw the factory before they reached it, and smelt it before they saw it; the pungent aroma of melting gum filled the air. They took an outside view of the factory from each of the three streets upon which it faces and wondered that they did not hear the whirr and clatter of machinery which it seemed must be within the walls, but aside from the clouds of thin, white smoke from the tall chimneys no sign of activity appeared, the place seemed struck with the paralysis of silence.


MELTING SHOPS, NEWARK WORKS.

Entering the office, they became conscious that they were in the presence of business activity, but at first imagined from the appointments and general appearance of the surroundings that they had got into the wrong place, some banking establishment down town, rather than the office of a varnish factory, which somehow they had imagined must be unclean, sticky, littered with cans and bottles, but here were Wilton carpets, elegant desks and furniture, clerks closely attentive to their work and every appearance of system and "plenty to do."

The Superintendent introduced himself, read the note of introduction which the Professor brought, and expressed his pleasure at their visit, saying that they were always glad to be called upon, and took a pride and pleasure in showing the works.

"This establishment has

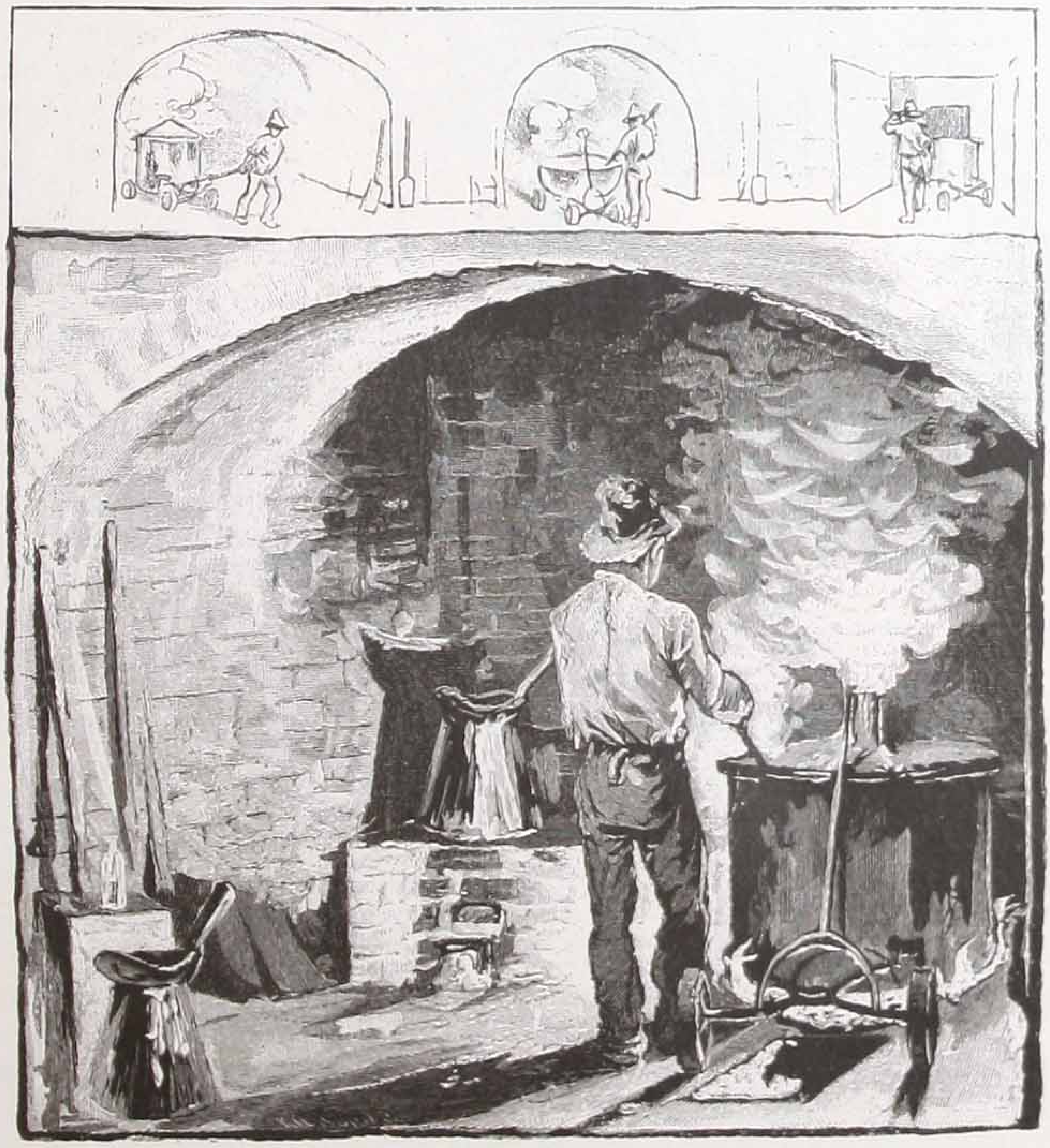
grown from almost nothing, I am told,'' said the visiting spokesman.

''Yes,'' replied the Superintendent, ''but that is the way with everything American. Energy and a straightforward purpose have done it. We began just after the war. The little shop then was merely a nest of kettles; but the proprietors labored over the kettles, gave personal attention to every detail and worked in the right direction to accomplish just what you see now, this immense establishment not excelled if equalled by any of its kind in the world, employing an immense capital and a large force of men.

''But this is only one. We have extensive works with equal facilities at Cleveland, Ohio, around which centers our entire Western varnish trade. The growth of our business in volume and geographical extent, rendered this Cleveland factory a necessity, long ago.''

''But why does so simple a process as making varnish must be, require so much room?'' inquired young Mr. Studley.

''Making good varnish,'' answered the Superintendent with a smile,'' is simple in the sense of not being complicated, but it is not simple in the sense of being easy. It is difficult for a score of reasons. It requires much room. We have recently enlarged the works, and our facilities

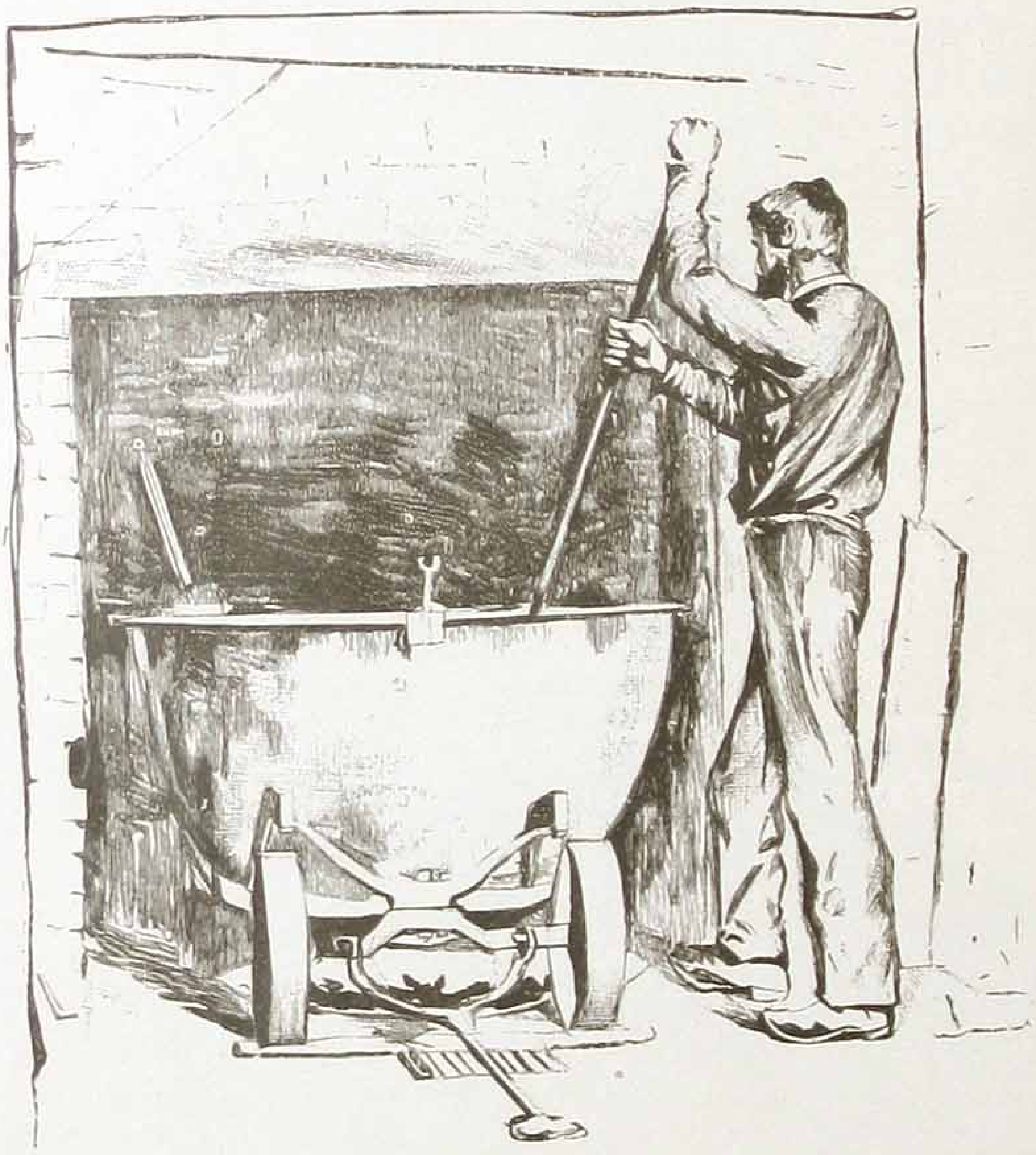


GUM MELTING.

are now sufficient to enable us to carry a year's supply of all the crude materials. So we can take constant advantage of the market, and buy when things are cheapest. We have greatly increased our tanks for varnish, so that our storage capacity here amounts to 235,000 gallons; in Cleveland, to 204,000 gallons, and in St. Louis and Chicago, 50,000 gallons. This enables the product to ripen, and acquire that necessary age without which the finest qualities of paleness, lustre and durability cannot be developed.''

''If you will kindly show us something of the method of manufacture,'' said the Professor,'' it will give us a more intelligent comprehension of an article in which as students we have become much interested.''

''With great pleasure,'' the Superintendent said. ''You all know,'' he added, as he opened a door to the interior and led them onward, ''that our varnish is made from gum copal, turpentine and linseed oil; that turpentine comes from the needle-bearing pines in the South; that the oil, to be fit for the best varnish, must be pressed from seed that has been grown and harvested under the most favorable conditions; and that the copal, or fossil resin, is adapted to the manufacture of the highest class of varnish in proportion as it is hard and ripe, and free from impurities.''



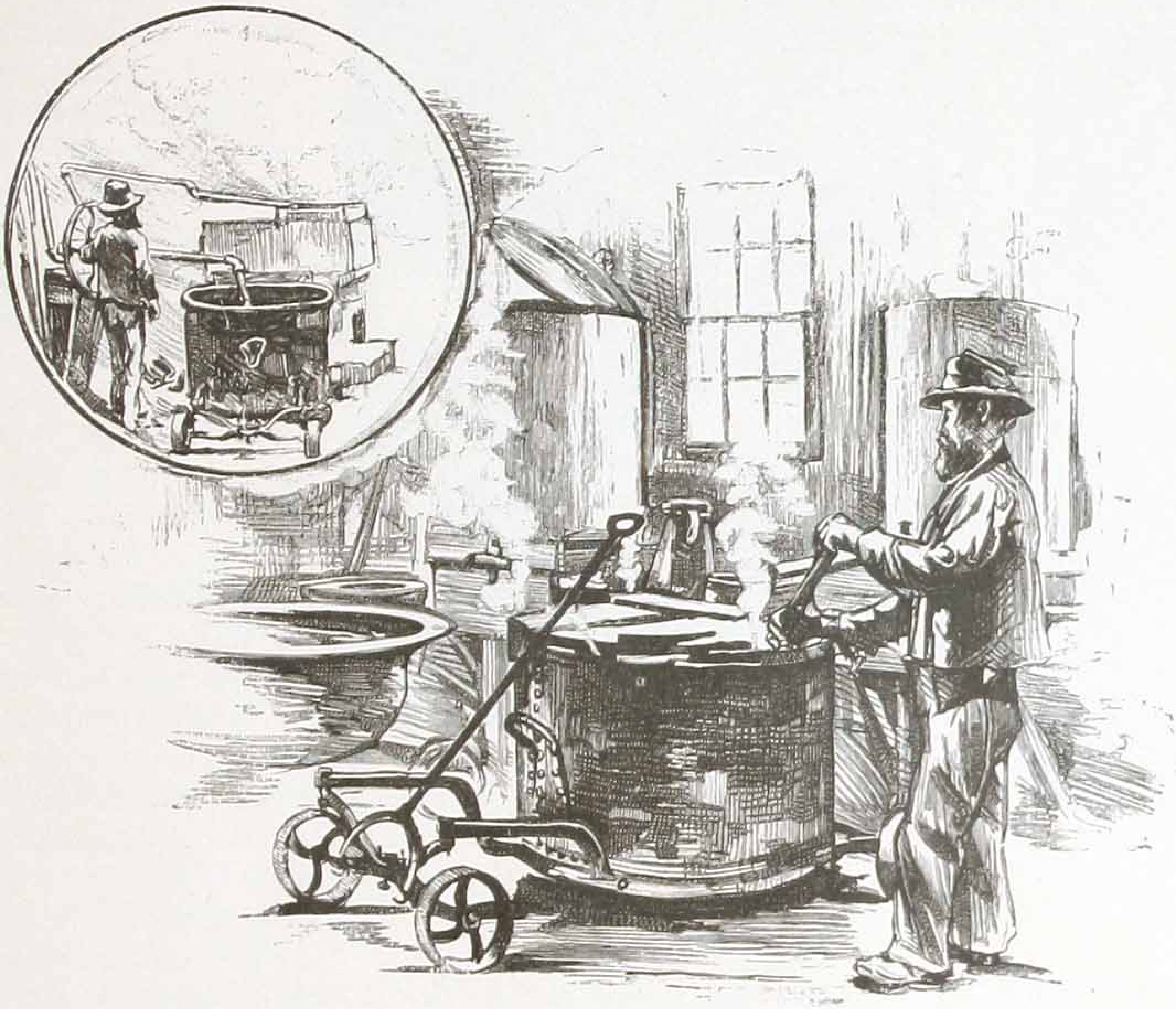
JAPAN BOILING.

Some of them did not know all of this, but they said, ''yes, of course,'' in concert and with much alacrity.

''Very well,'' said he ''let us go to the gum room first; we'll start at the beginning. This is some of the copal just wheeled into this long room from the store-house; you see it is brown or lemon-colored; the way in which it is broken shows you that it is brittle; it is of all sizes up to a peck measure; it is more or less impure, although the native boys and girls of the savage coasts have ostensibly cleansed it before shipping it to us.''

The attention of the visitors was already attracted to a row of boys sitting at a row of tables, with their faces to a row of windows.

''These boys,'' said the Superintendent, ''are giving the gum a second cleaning and then breaking it up and assorting it in different lots.'' Each lad was armed with a sort of hatchet-head, with an edge at one end and a hammer at the other, and with this he was breaking his quota into small

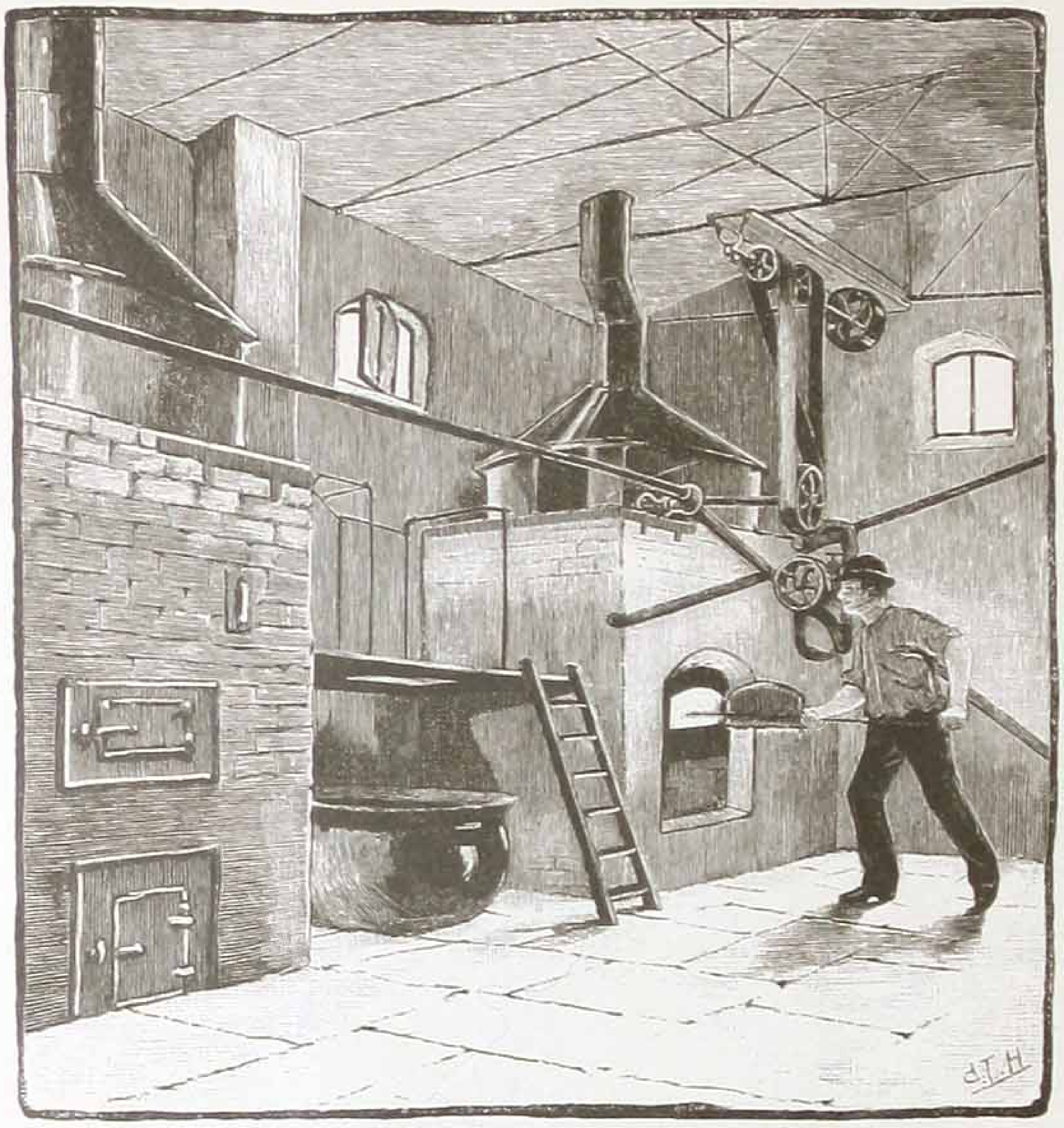


THINNING DOWN AND EMPTYING.

lumps for the melting-kettle, and throwing the different grades into different boxes.

"This," continued the Superintendent, "is an illustration of the fine detail which characterizes all of the work in our factory. Instead of putting the copal into the kettle promiscuously, assuming that it is all alike, we grade it with the greatest care into best, second best, and so on; we keep these varieties separate to the end; we supply the other ingredients with equal care, and we know just exactly what we have got, and we get just what we go for. After the first crude division it is all reassorted, and classified according to clearness, purity and hardness."

The boys hammered away at their light work and the visitors moved on to the oil-house, where the linseed oil is boiled, to prepare it for receiving the copal. "This department being very important, has the special oversight of our chemist. It isn't every lot of raw oil that we can accept. Oil differs greatly owing to the difference in the seed, and the conditions of climate and soil where it is grown; but we have tests of quality, and discard all that does not come up to the requirements. As the oil is accepted, it is pumped into the big tanks up stairs, which are connected by pipes with the large boiling pots here. It is drawn down here to be treated—in a five-hundred gallon kettle-full at a time—and then pumped back into the storehouse into tanks which hold each a single boiling. There it is left a long time to settle, clarify and brighten—from one month to six. The sediment all goes to the bottom in time, and the surface oil, now as clear as sunlight, is drawn off to mix with melted gum as it is wanted."



THE OIL HOUSE.

Leaving the oil-house, Gwynne espied two enormous tanks and exclaimed, "Oh, that's where you keep your varnish is it?"

The Superintendent smilingly answered, "No, my lad, those are turpentine storage tanks and hold 50,000 gallons. In the storage building yonder we have a cellar full of iron tanks in which we carry the balance of our turpentine, over there where you see that workman emptying a barrel into what looks like a hole in the ground, but which is really a pipe conducting the turpentine to the series of tanks. At our Cleveland works we have a turpentine tank which holds 85,000 gallons."

"Whew!"

"I don't see as we have got to the real varnish making yet," said Gwynne.

"Yes, we have just got to it," said the Superintendent. "It takes longer to get to it than it does to get through it. Now, you see we have all the three ingredients in hand, ready to go ahead, and produce the sort of varnish called for. A varnish of a certain quality is needed. The foreman of the melting-room goes to the gum-room, wheeling his great copper-kettle set on wheels of its own. He weighs out from one of the many bins the quantity and kind of copal required for the grade he is to make, returns with it to the melting-room, covers it with a copper cap with an escape for noxious fumes, and wheels it into one of the spacious fire-places. Here he is now. Let us follow him."

In they went and saw the kettle wheeled over a bed of live coals, the melting gum being stirred with a peculiar looking instrument by an attendant who occasionally withdrew his stirrer and gazed intently at the dripping gum "He is watching the cooking," said the Superintendent.

The Professor remarked upon the pleasant temperature of the room and its freedom from noxious gases, and was told by the foreman that in building that melting room scientific engineering had given them sharper fires, better draft, and, most important of all, perfect control over the suffocating fumes from the kettles, so that the melter is now entirely free from the objections common to all the ordinary melting shops. "These six fires," said he, "are supplied with air from an underground shaft controlled by these rods, while these hoods prevent the escape of the fumes into the room.

Our other melting rooms have all been remodeled in the same way."

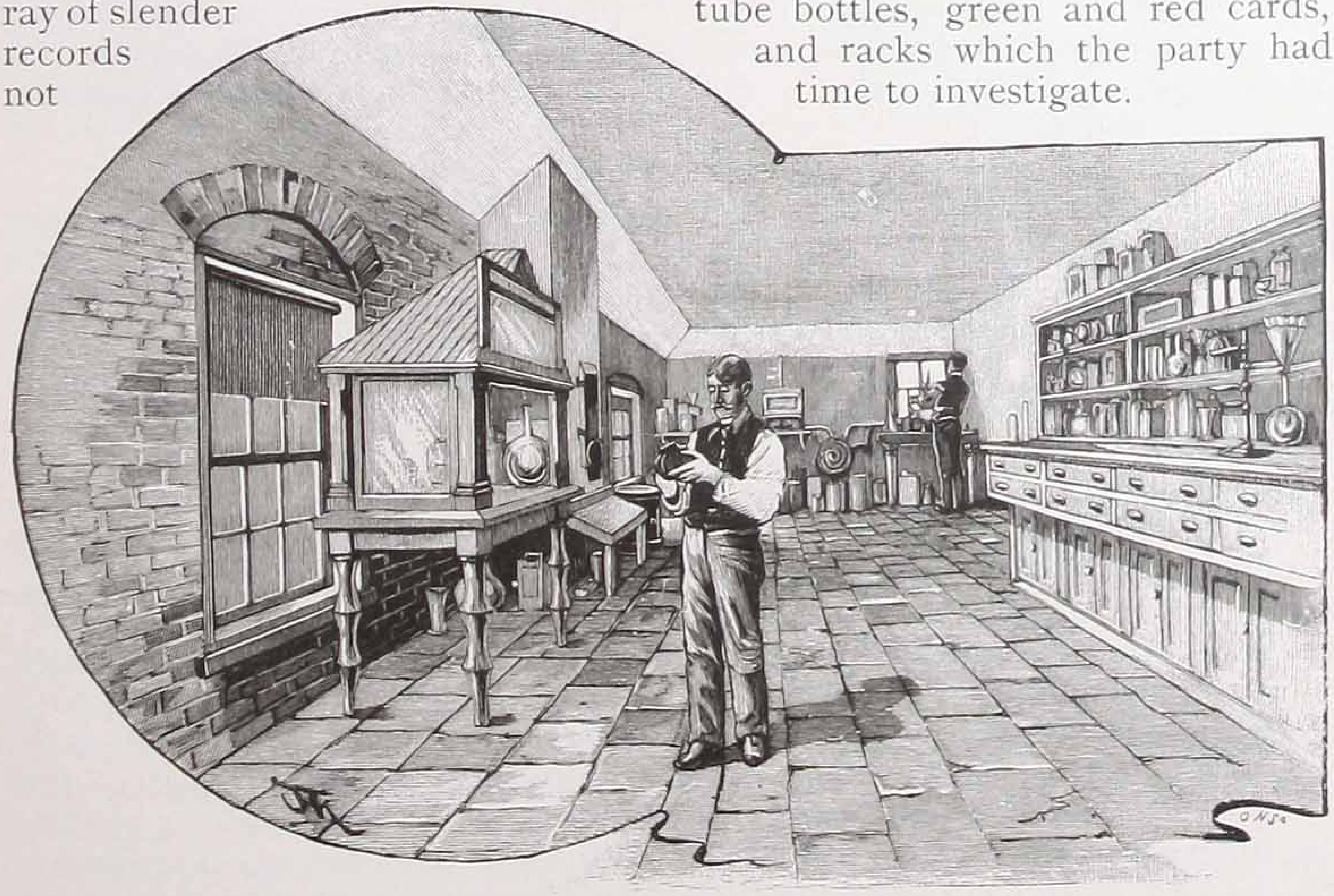
"So that's varnish, is it?" asked Gwynne, who had not paid strict attention.

"No," answered the Superintendent smiling, "but it is going to be. When the gum is melted, the kettle is drawn from the fire, and a certain percentage of the prepared oil is added. It is again stirred thoroughly, pushed again over the fire and boiled to a certain point, hauled off again, and wheeled to the thinning room, and as it cools the requisite amount of turpentine is added from one of the service pipes. Then the varnish is virtually made. It remains only to strain it, and pump it through a special system of pipes to one of the storerooms, where great tanks on stone platforms receive and preserve it while it goes through the mysterious ripening process."

Proceeding to the "thinning room," they watched with interest the careful introduction of the turpentine from an elevated tank into which the requisite quantity of turpentine had been "run" from the supply tanks outside. It was allowed to trickle into the intensely hot mixture, slowly at first, causing great clouds of white vapor, then gradually more freely as the contents cooled, until the tube gauge on the side of the tank showed that it was emptied.

This completed what might be termed the mechanical processes of the manufacture.

They couldn't follow the varnish into the storage rooms through the pipes, but a ring at a mysterious looking door was speedily answered and the party were ushered by the foreman of that department into a series of rooms lined on sides and ends with huge boiler iron tanks having a capacity from 1,000 to 5,000 gallons each. Large open tanks were in one room filled with varnish fresh from the strainers, and waiting to be pumped into the proper storage tanks; while in the foreman's office was a confusing array of slender tube bottles, green and red cards, records and racks which the party had not time to investigate.



LABORATORY.

"These two tanks" said the Superintendent, pointing to two structures that occupied the entire end of one of the rooms, "are called 'The Twins,' while that grim fellow at the other end who seems to stand guard over all has been christened by the workmen 'Jumbo.' "

"Are they full?" queried the Professor, who was evidently a little surprised at the surroundings.

"Yes, sir; there are in these tanks over 150,000 gallons of fine, high grade Carriage and Car Varnishes, and here they stay until 'ripe and fit, as we say."

"Goodness," said Hastings, "I should think you had enough varnish here for all the railroads in the country."

"Well," says the Superintendent, "most all of them will get some of it, but we seem to have to keep the pump working every day.

"We've got the varnish made," continued he, "now let us go to the shipping room."

"Is this 'ripening' a fancy?" asked the Professor, "or is it an indispensable step in the manufacture?"

"No more a fancy," answered the Superintendent, "than the ripening of an apple is a fancy. The very finest grades require from four to twelve months to ripen, and sometimes a good deal more time is spent. And there is no guess-work about it, any more than about the other steps taken; for a practical carriage-painter over in our test room frequently tests it—tries it on the same surfaces and under the same conditions as the final customer will, and not till it proves its merits is it allowed to leave the factory."

"What, more tanks?" exclaimed the Professor, who was by this time as eager and attentive as any of his scholars. They had reached the shipping department.

"Yes, not only on this floor, but each tank is duplicated on the floor above us. Into these upper tanks the varnish is pumped from the storage rooms after the proper time, and here they are again frequently tested by our expert whom we will next visit, and only after his final verdict that he 'cannot make 'em go wrong' do they get down stairs and ready to ship in execution of orders."

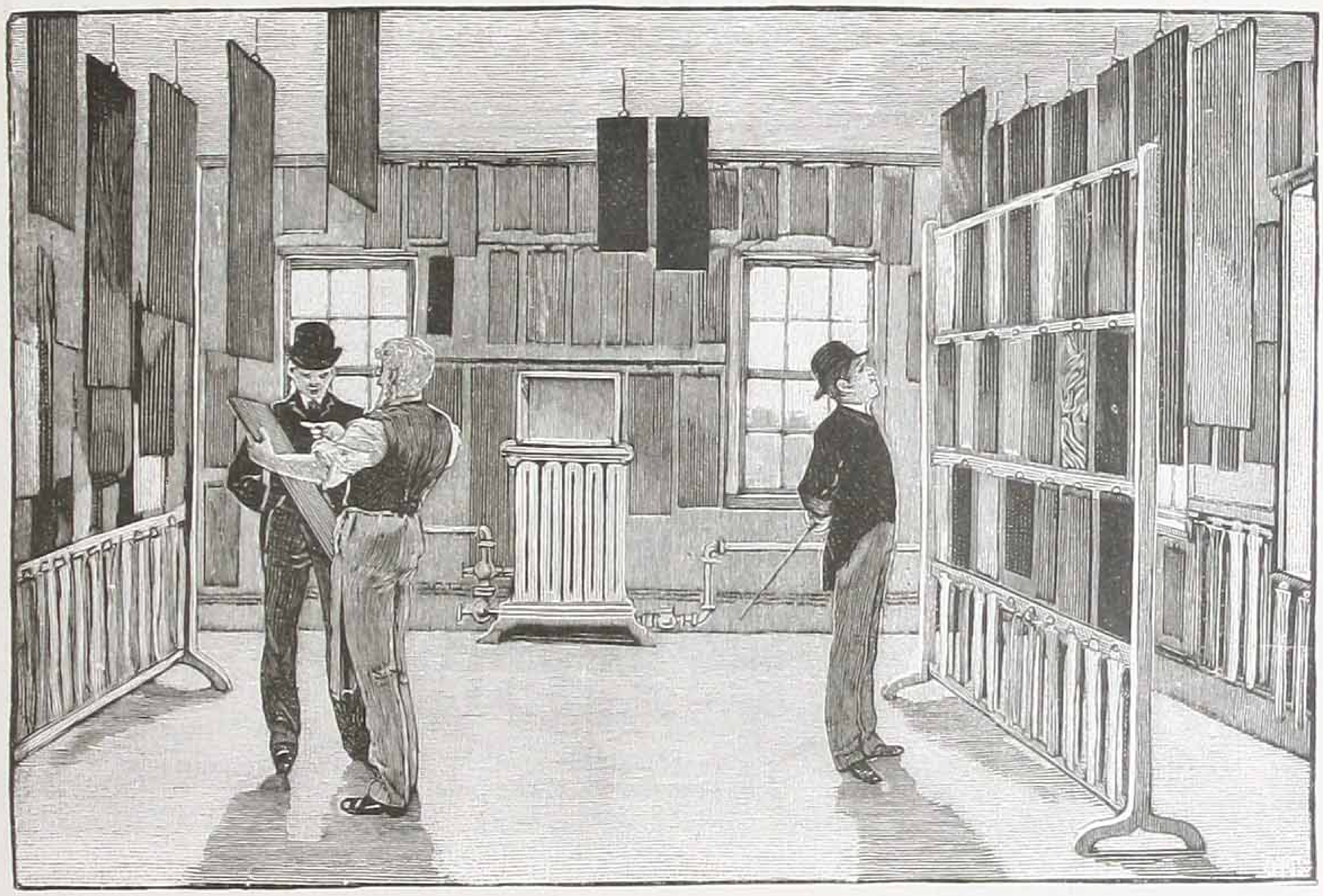
"What a gauntlet they have to run," said Harper.

"Yes, but it is all necessary. Varnish is very balky, skittish and strong-headed sometimes."

"Yes," spoke up Mr. Hastings; "the foreman of the car shop told us something about the curious deviltries of varnish."

"A lot of trouble, it seems," said Gilder. "He told us that it sometimes got specky, and crawly, and pinholy, and a whole lot of other improprieties."

"If you will walk over to the testing-room," suggested the Superintendent, leading the way, "you will see what means we have taken to protect our customers against the viciousness of varnish." As they paused presently in the room he added: "varnish sometimes acts as if totally depraved. We have more than fifty epithets which we use to describe the various sorts of improper conduct of which varnish is capable. This conduct is not only objectionable, but it is frequently inscrutable and unaccountable. But by the careful selection of proper material and a perfect knowledge of the necessary treatment we are able to eliminate these deviltries so far as they are inherent to the varnish itself, providing there has been no carelessness on the part of the workmen, and the formulas have been carried out with the requisite precision. That is to say, that we now have standard formulas for each grade which, if properly followed, will produce perfect results. Our test room is practically a check on the carelessness of the workmen. No varnish can be produced that will be insensible to the effects of poor ventilation, sudden changes of temperature, or inferior painting; these cause some of the 'deviltries,' and yet the time is not passed when the varnish maker is held responsible even for these. All that we can do is to make a varnish that will give perfect results under what may be called ordinary shop conditions. Here in this room we verify the correctness of our formulas and the precision of our work. In charge of it is a carriage painter famous fifteen years ago for his skill as a varnisher, and who during all the time since then has been testing, from a critical standpoint, anywhere from two or three to a dozen or more kinds of varnish each day, until it may be doubted if there is in the world a varnisher of equal experience or one whose opinion may be taken with so much confidence. His province is to test from time to time during the ripening process each tank of our varnish from the standpoint of a paid critic, and any tank which fails in any respect to reach the required standard in body, color, drying, lustre or any of the many points in which it should be perfect, is detected and reported and corrected before being sent to the shipping room."



TESTING ROOM.

"Ah," said Clements, "this makes me think of father's place, all these spokes and panels, and here's a panel that's got the enamel devil I suppose."

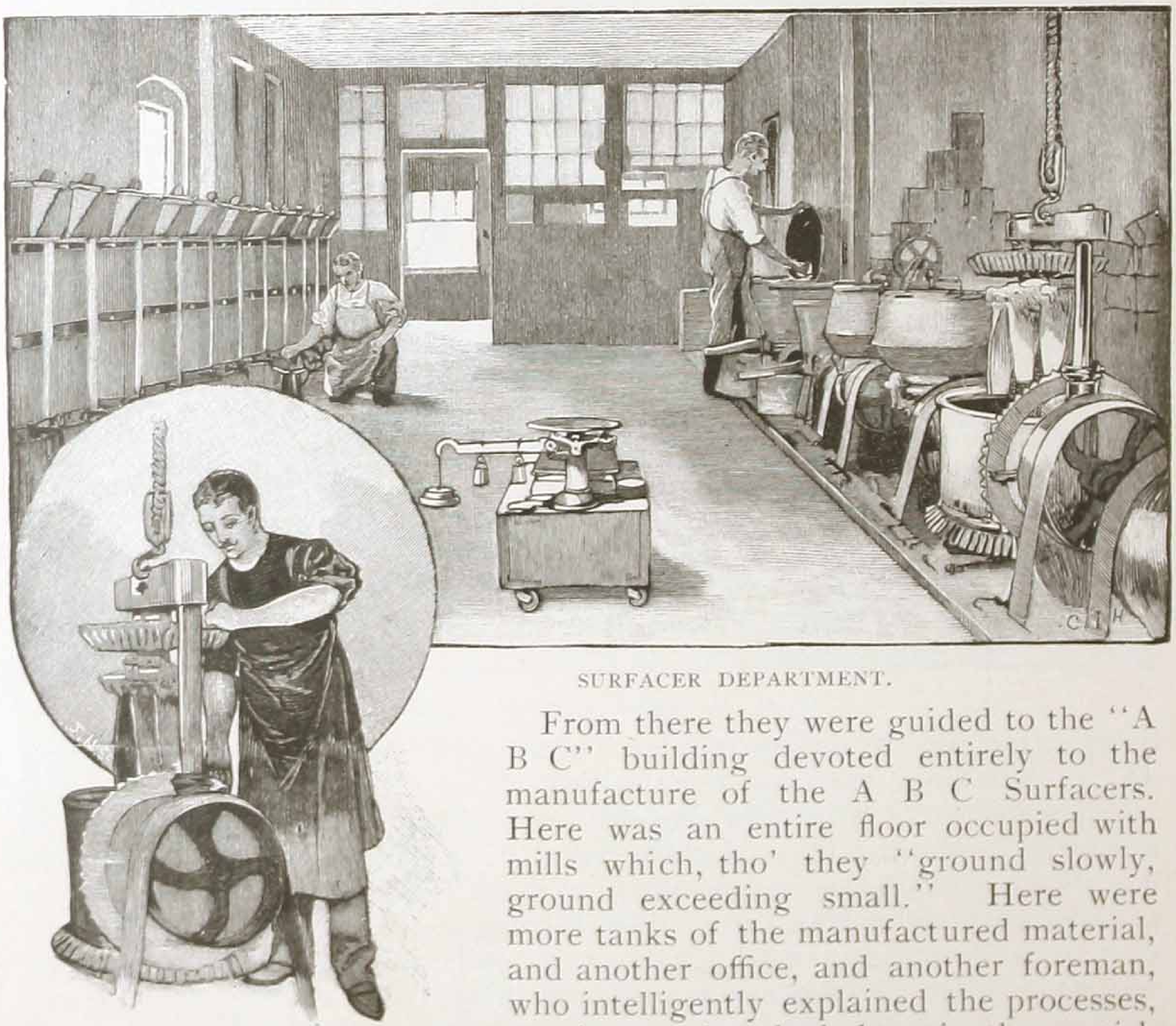
The expert explained this and various other panels exhibited which didn't look just right, and told the party how some were due to unripe stock, some to improperly dried undercoats, some to change of temperature and some to the man who was at the handle of the brush.

"By this careful supervision," said the Superintendent, "we head off the devil and all his works."

Percy Gwynne availed himself of a large panel to rearrange his necktie and a curl of hair that had escaped from its careful *neglige* upon his forehead.

As they left the expert's room, the Professor began to thank his guide for his attentive courtesy, when the Superintendent suggested that there would be another train in an hour, which would give them time to visit the laboratory and see the rest of the works.

The boys, whose interest had not flagged, voted for "more," and entering the laboratory, gazed upon odd looking apparatus in copper and glass, looked at the library of books with strange titles in various languages, carefully abstained from meddling with jars of odd looking mixtures, and began to think that making varnish couldn't be such a simple and easy matter after all.



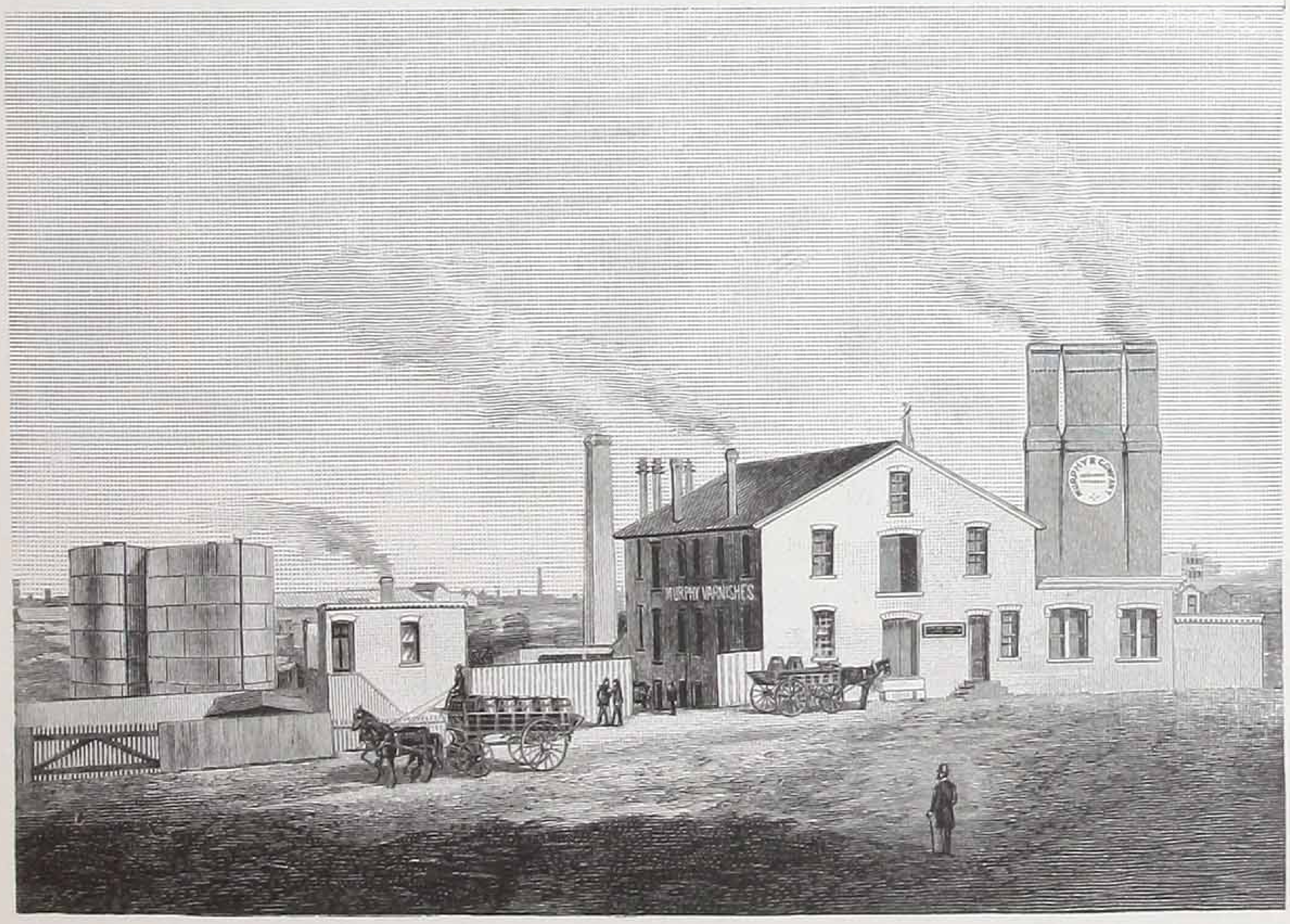
SURFACER DEPARTMENT.

From there they were guided to the "A B C" building devoted entirely to the manufacture of the A B C Surfacers. Here was an entire floor occupied with mills which, tho' they "ground slowly, ground exceeding small." Here were more tanks of the manufactured material, and another office, and another foreman, who intelligently explained the processes, starting as they had done in the varnish department with the raw material in bins, substituting the grinding mills for the pot fires, the belting for the tall draft chimneys, the giant mixers for the "Twins" and "Jumbo" and the canning department for the shipping room. It was, in fact, a visit to quite a different factory.

The Professor remarked that he "supposed that at your Cleveland Factory pretty much of the same thing would be seen, same processes, same routine, etc." Confessed that "his interest was aroused," and that he "wanted to know it all, and would join his own class as a scholar, resigning his position as teacher in favor of the Superintendent," who declined the honor with thanks, but informed them that at Cleveland they would find the same complete and thorough system governing the work, the same attention to details and the same safeguards to insure perfect results, although the factory was devoted to the production of superior Wagon, Implement and Cabinet Varnishes, as well as Japans.

"Recognizing the necessity of uniformity of quality as being next important to excellence, we have deemed it best to have all of our fine, high grade Coach and Car Varnishes made here at Newark. None are therefore made at Cleveland, and the production there comprises the less expensive Coach and Wagon Varnishes, Varnishes for Agricultural Implements, Furniture and House Varnishes, Shellacs, Japans, etc. In fact, there is no grade of varnsh used in mechanical trades that we do not make. Here in Newark we make the full line from Palest Durable Body, for finest coach work, to "Tub" and "Pail" Varnish, melting all grades of gum, from the choicest Zanzibar down to the common qualities. Over seventy per cent. of our product, however, is the high grade Coach, Carriage and Piano Varnishes. But whatever the grade may be, sir, the rule is, make it better than anything of its kind in the market, and be sure it is better, or don't send it out. We have special melters for each class of varnishes, each making only the grades of his special class."

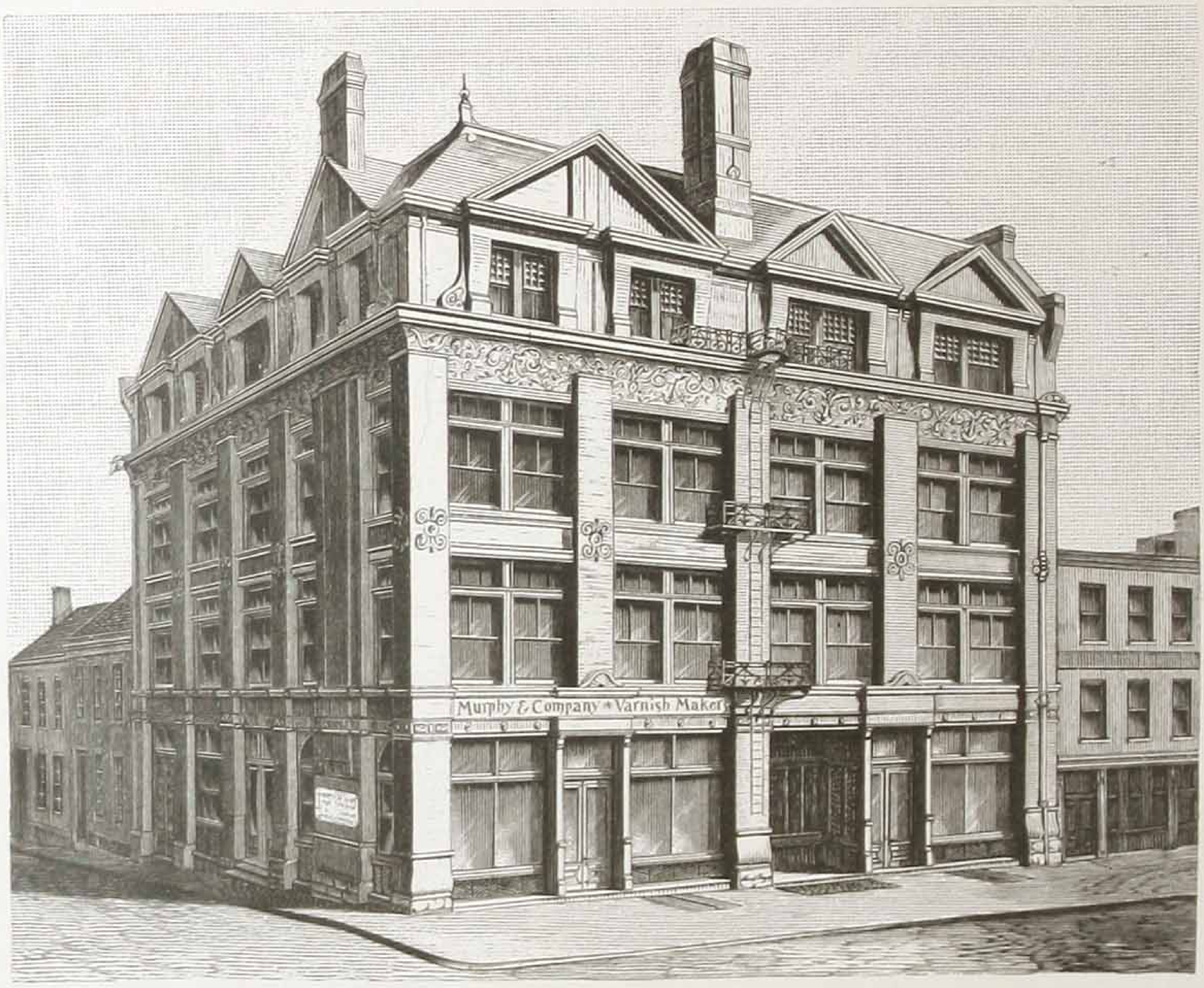
"About how many gallons can you produce in a day?" asked the Professor.



WORKS AT CLEVELAND, OHIO.

"Our storage arrangements are such that we are never compelled to work up to our full capacity, but we have a running capacity of about two thousand gallons of Varnish and Japan daily, or over half a million gallons annually, consuming five hundred tons of Copal and corresponding amounts of linseed oil and turpentine."

On their way back to the office, one of the party having expressed some interest in the history of the house, the following sketch of the business was briefly recited to them: Murphy & Company began the varnish business in 1865, in Newark, N. J., succeeding the firm of Thompson, Price & Co., who were themselves established in 1845. Their premises at 26 and 28 Oliver St., were quite modest but sufficient for their needs. In 1869, their Cleveland Works were established to accommodate the growth of their business in the West. Two years later their Newark Works were removed to the block bounded by McWhorter, Chestnut and Vesey Sts., where substantial buildings were erected, which have been added to almost yearly since, until in their present extent and completeness they are now probably without an equal.



ST. LOUIS BUILDING OF MURPHY & CO.

In 1882, in order to accommodate the increasing volume of their Eastern business, their New York office was opened at 231 Broadway, and was removed three years later to its present location two doors below, to 227 Broadway, corner of Barclay St., immediately opposite the Post Office.

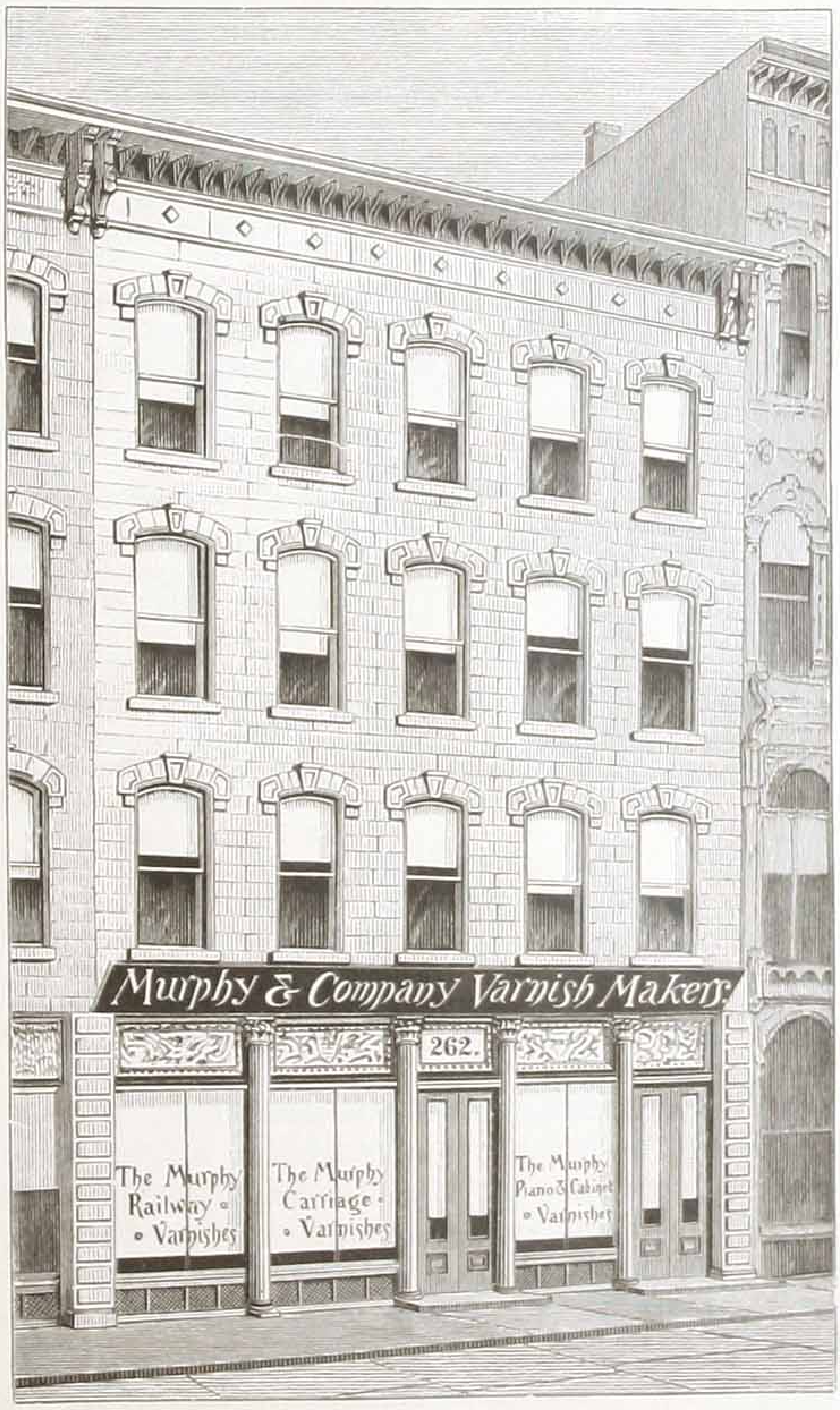
In March, 1883, their St. Louis house was established, and in February, 1884, their Chicago house was opened at 262 Wabash Ave. All the fine Coach and Railway Varnishes are made at the Newark Works, and distributed to the other establishments as they are needed, special and abundant tankage being provided for their storage.

After this, it was suggested that a visit be made to the cooper shop.

"What," says Gwynne, "do you make your own barrels? I should think you would have enough of those turpentine barrels I saw being emptied.''

''Oh, no,'' said the Superintendent, ''we believe in the 'eternal fitness of things' and don't want to put 'new wine into old bottles.' We make all of our barrels, and make 'em as well as we know how. Leaky packages mean loss and trouble.''

The visitors tried to hear more, but a cooper shop isn't just the best place in the world in which to listen.


Murphy & Company Varnish Makers
262.
The Murphy Railway Varnishes
The Murphy Carriage Varnishes
The Murphy Piano & Cabinet Varnishes

CHICAGO OFFICE OF MURPHY & CO.

They visited the engine and boiler room, from whence is obtained the power for the Surfacer Mills and the live steam to operate three smaller engines, one working the various pumps, one in the shellac department, and one operating the printing presses, and on their way back to the office, inspected the printing department, where are prepared the labels, price-lists, circulars, books of instruction, and other printed matter, the wide distribution of which has served to make the ''Murphy Varnishes'' a household word among all those interested in varnishes.

They at last reached the office, declining a polite invitation to go up-stairs into the shellac department, contenting themselves with their guide's assurances that it was not complicated, being simply the dissolving of the gum in grain alcohol, in casks revolved on heavy framework of oak. In fact, the party thought the easy chairs in the inner office much more tempting.

Their guide was called away, and in his absence they inspected the cabinet of petrific curiosities which the proprietors have gathered from the yellow gleanings of the coast of Africa and the Islands of the sea. Some were almost pure amber, exhibited merely for their brilliant purity, and others were the luminous prisons of bugs, flies and ants, caught there and held while the gum was in a fluent state, a fragrant balsam, ages ago. Here was a butterfly, with wings spread as if in flight; here a honey-bee, bringing home his store of golden pollen; here a preserved spider with a fly struck dead in his fangs coming down to us from the time before Moses—"in the beginning of years."

Mr. Harper said he had something bearing on that subject, and from his *porte-monnaie* he rescued and read the following poem by W. A. Croffut, which he had cut from a newspaper, on a five-legged lizard thus buried in amber:

TO A LIZARD IN AMBER.

O, bright-eyed swimmer from diluvial seas,
Thou tiny cousin of the Plesiosaurus,
What mocking sylph, beneath the cypress trees,
Discarding flies and fleas, and bugs and bees,
Embalmed thee for us?

Dwelt thou with man primeval in his lair
On hills Carpathian or desert Lybian?
Or didst thou with the gods Olympus share,
'Mid each high state living unnoticed there,
Thou small amphibian?

Who pinioned thy grotesque and uncouth frame
Within the sunshine of this golden chamber?
Is this the fountain whence the nectar came?
Or is it star-born,—this undying flame
That men call amber?

Or is this jewel formed of sweet tears shed
By fair Heliades—Apollo's daughters—
When their rash brother down the welkin sped
Lashing his father's sun-team, and fell dead
In Euxine waters?

Splay-footed sprawler from the unknown seas—
O, tawny cousin of the Plesiosaurus,—
What sportive sister of Hesperides,
In the ambrosia of celestial trees,
Embalmed thee for us?

The Professor remarked that it set to verse the old superstitions and traditions about the supernatural origin of amber. In one of the preserved specimens in the cabinet a mosquito had found a crystal tomb; in some lumps hundreds of gnats were embedded, like currants in a cake. So the remote past is made to minister to the present. Our furniture, our musical instruments, our carriages and our cars are made lustrous by coating them with the ground-up coffins of living creatures that fluttered their wings and struggled their little life and died before the birth of Columbus—perhaps before the planning of the pyramids.

The Superintendent returned and, glancing at his watch, remarked that they had some twenty minutes or more before train time, and if they were able to stand a little more talk from him he would fill in the time.

He was earnestly requested to proceed, and he proceeded:

"There is no trick about our business," said he. "It is the old-fashioned story that it pays to do good work, and to advance from good work to better work whenever it is possible. We have no disguises and no false pretences. We try to make our varnishes as well as varnishes can possibly be made. We do not try to compete in price with any inferior article on the market. We think we are working from a little higher standard than others, and we secure greater uniformity of excellence in our results. Good results are sometimes attained by the guess-work manufacturer—often, perhaps—but he doesn't know exactly what to attribute his success to. We have substituted science for hap-hazard. We use the rule and the thermometer. We have put the chemist at work and have pretty nearly eliminated the results of conjecture and carelessness. Prophecy is the test of science, and the test holds good in our establishment; we are able to predict. Given the materials, the measure, the weight, the time, the temperature, the treatment, and we know what sort of varnish to anticipate.

"This condition of affairs has not been reached suddenly. We have had our unhappy experiences of condemned and returned goods, but the percentage grew less year by year, and we only occasionally now have a can come back to us, but the returns are so infrequent that they do not disturb us. We are not indifferent to complaints, but get all the particulars we can, and test every returned lot. The result of our investigations generally demonstrates that the varnish was applied under conditions that would spoil any varnish.

"When we sell a can of varnish we know just exactly what we are delivering; for we have not only formulas and rules, but we have laboratory tests, and then, to cap all, practical tests of every tank by an expert painter, employed not to compliment our goods but to criticize them.

"We have advanced from the level of uncertainty and experiment to the level of knowledge. We try to produce the best possible product without regard to expense, for we have felt that if we could make a better varnish at a higher cost it would more than pay in the end by its beauty and durability, as compared with an inferior article which must be renewed every six months."

The Professor here inquired: "How can you tell good varnish, and what are the properties of good varnish?" The Superintendent appeared pleased at this interest shown, and settling himself comfortably in his easy chair, spoke as follows:

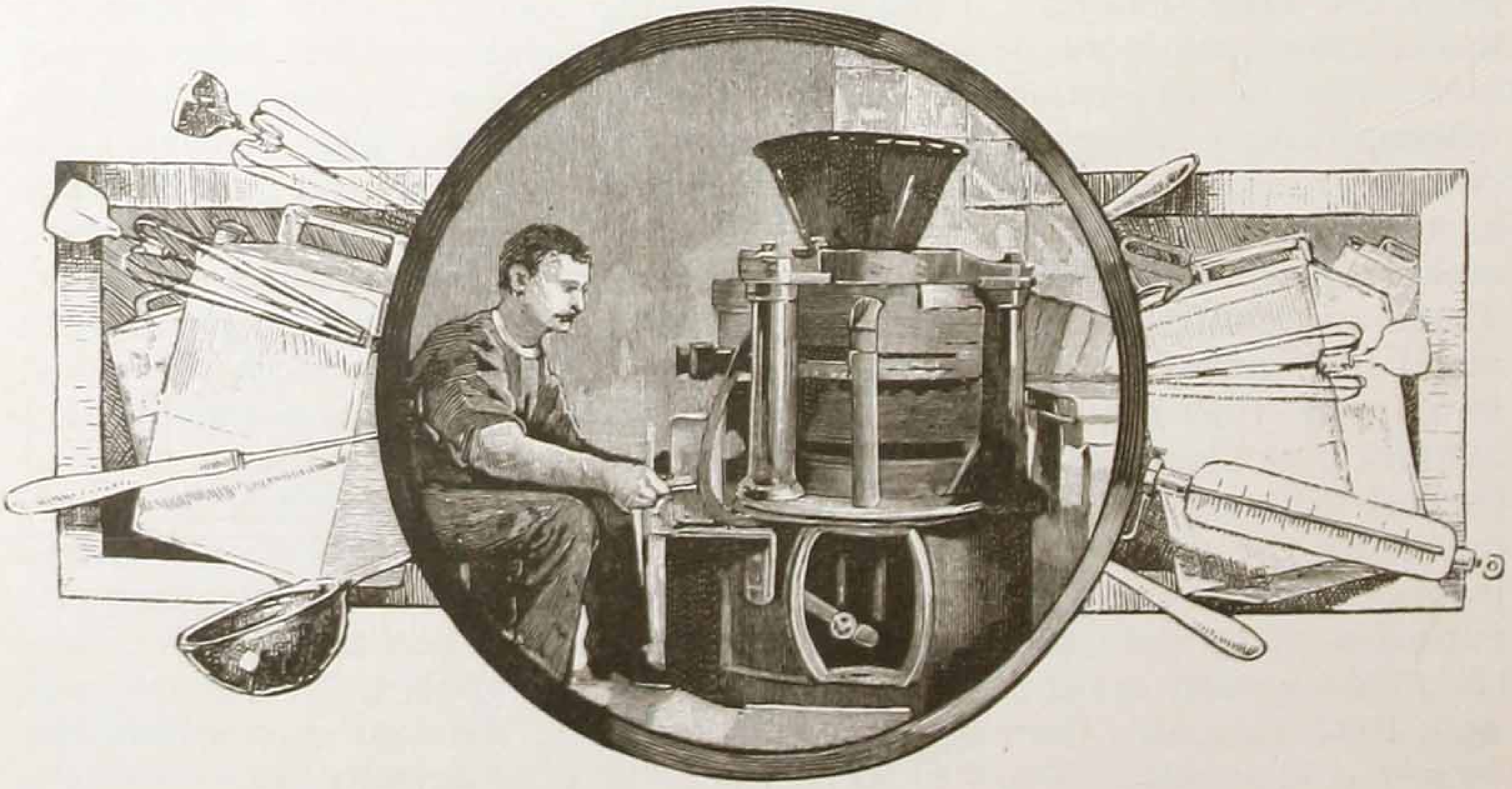
"The varnishes of different manufacturers are all made from substantially the same materials. But owing to the fact that their manufacture has always been more or less secret, the formulas all differ more or less both as to the proportions of materials used and the processes by which the materials are put together. The result is that each maker's varnish has certain peculiarities which make it distinct from any other, and the difference in these peculiarities is what makes the difference in value of different makers' products. These can readily be discerned by the expert varnisher. There are features which all varnishes must possess in order to make them at all satisfactory for best work. They must have good body, they must flow freely, they must dry well, and they must have an even and brilliant lustre. But there may be a difference of ten per cent. in the quantity of surface different varnishes will cover, and those that cover the most surface work the most freely under the brush, so that the cost of application is less. The length of time a varnish will wear is one of the most important points to be considered and one in which there is perhaps greater difference than in any other. As it costs no more to apply a varnish that will wear twelve months than one that will wear six, the real economy of the former is apparent. Neither should the value of uniformity be overlooked. The houses are few where absolute uniformity may at all times be relied upon with confidence. In our business it is possible to take the best materials in the world, and by ignorance or carelessness make a varnish that is practically worthless.

"Now take the japans also, which we make very largely for the paint makers and general trade; you'll find wide differences in their value. The main purpose of a japan is to dry paint, but as some paints are largely composed of oil, it is important it should mix with raw oil without curdling. This test is readily made. But there are few things in which the difference is greater than in the drying power of japan. Recent tests between the drying powers of japans of prominent makers showed a difference of over two hundred per cent. That is, one gallon of one maker would dry as much paint as three gallons of another.

"It is wise to investigate the character and position of the house from which you buy your varnish. Nothing will pay a varnish buyer better than to find out what house can supply him uniformly with the sort of varnish he needs, and then tie up closely to that house. This may be laid down as a general principle, for there is scarcely any other department of industry where the use of an inferior article is attended with such annoyance, loss and mischief."

The Professor and his pupils expressed their thanks and obligations, and were accompanied to the door by the Superintendent. As they stood upon the steps saying good-by, Studley saw across the street more buildings bearing the sign "Murphy & Company," and intimated to the Superintendent that they would as lief wait over another train if there was any more to be seen, but was told that they were the watchman's dwelling, the stables, truck houses and storage sheds for barrels, cases, gum, etc., not necessarily associated with varnish making, more than with any other industry.

The Professor and his charges accordingly departed for the train, satisfied that the subject for their day's lesson had been happily chosen, that the afternoon had been pleasantly and profitably spent, and realizing that the poets who had spoken slurringly of varnish were wise only "in their own generation," not in this.



V·M

M·V